DOCUMENT RESUME

ED 345 460 EC 301 221

AUTHOR Kelso, Rose-Anne; Price, Sue
TITLE Activities for Babies and Toddlers with Down Syndrome: A Physiotherapy Approach.
INSTITUTION Queensland Univ., Brisbane (Australia). Fred and Eleanor Schonell Educational Research Centre.
REPORT NO ISBN-0-86776-274-8
PUB DATE 88
NOTE 80p.
AVAILABLE FROM University of Queensland, St. Lucia, Queensland 4067, Australia ($20.00 Australian).
PUB TYPE Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Child Rearing; *Downs Syndrome; Foreign Countries; Human Posture; Infants; Interaction; Interpersonal Competence; Motion; *Motor Development; *Movement Education; Object Manipulation; Perceptual Motor Coordination; *Physical Therapy; Preschool Education; *Psychomotor Skills; Skill Development; Social Development; Stimulation; Toddlers
IDENTIFIERS Australia

ABSTRACT

Children with Down Syndrome have the potential for the development of a large range and variety of postures, balance reactions, movements, and skills. Sometimes this potential remains relatively untapped resulting in unusual, inefficient, or even detrimental patterns of movement. By handling and playing with the child, he or she becomes more aware of his body, social environment, and physical environment, and their relationship to each other. This book presents activities selected to meet the specific needs of a child with Down Syndrome. The activities may be adapted and modified to become part of the normal daily handling of and interaction with the baby. No age limit is applied to any of the activities as there is a wide age range in the achievement of all babies. Following an outline of basic physiotherapy principles, a section titled "What To Do First" discusses carrying the baby, feeding, increasing awareness, head control, rolling over, picking up, and social interaction. The next section, "When Baby Is Older," covers the same activities while keeping in mind the more advanced stage of the baby's development and his or her larger size, and also covers fine motor activities. "The Pre-Toddler Stage" suggests activities for feeding, sitting, balancing in sitting, preparing for crawling, preparing for standing and walking, fine motor activities, and social interaction. The final section, titled "Time for Coordination," focuses on sidestepping, walking forward, climbing down, increasing awareness, fine motor activities, and social interaction. (JDD)

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ACTIVITIES FOR BABIES AND TODDLERS WITH DOWN SYNDROME: A PHYSIOTHERAPY APPROACH

Rose-Anne Kelso & Sue Price

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University of Queensland

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ISBN 0 86776 274 8

FOREWORD

Movement is an integral part of living. The range and variety of movements used by children in everyday activities is enormous. Despite this we tend to pay little attention to how these movements occur and the important inter-relationships between posture, balance and motor function until they fail to develop or are unusual in the way they are performed.

Children with Down Syndrome have the potential for the development of a large range and variety of postures, balance reactions, movements and skills. Sometimes this potential remains relatively untapped resulting in unusual, inefficient or even detrimental patterns of movement.

Roseanne Kelso and Sue Price are physiotherapists with a keen interest in the development of movement in infants and young children with Down Syndrome. Even as students they became aware of the need for parents to understand how to continue with their children at home, the activities carried out and encouraged by the physiotherapists. To help meet this need they made a slide-tape programme for parents but this was not enough, as parents found it difficult to retain the information and to have access to the programme. The need for a booklet became obvious. But professional and family commitments occupied their time for a number of years. Now the experience gained throughout this time has added a further valuable dimension to their work.

The authors have written this book for parents and therefore have kept the style direct and the amount of detail and complex terminology to a minimum. It is hoped that every family will have access to physiotherapy advice regarding the individual movement needs of their child and that the information in the booklet will provide helpful background support. However, if individual advice is not accessible, then I am sure you will find a wealth of ideas to be implemented at the appropriate stage.

The privilege of working with the children and their families is one which is never taken for granted. I commend the book to you, and with Roseanne and Sue sincerely hope that it may be another step in the right direction.

Yvonne R. Burns, PhD
Physiotherapy Department
University of Queensland

ACKNOWLEDGMENTS

If this publication should achieve its aim of making a positive contribution to the development of children with Down Syndrome, it will, in no small part, be due to the inspiration of Coralie Price. Coralie stimulated the authors into designing their initial programme which was completed several years ago under the guidance of Dr. Yvonne Burns.

Some of the photographs in the present book were taken for the initial programme. They include photographs of Michael Cameron, in whose memory a fund has been established to support research into Down Syndrome. The present publication was largely financed by this fund for which thanks go to Michael's family and to all those who supported the fund.

The authors also thank everyone who encouraged the production of this book and who helped to guide its final form. Special thanks go to Sonja, Malcolm, Rebecca, Erin, Andrea, Hollie, Louise, David, Katie and their parents.

Jeanette Short's major contribution to the initial version of this publication is gratefully acknowledged.

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INTRODUCTION

This program has been devised so that you can help give your child with Down Syndrome a better start in life. Many parents in the past have had low expectations of their children and have not encouraged them to achieve the goals that are expected of a normal child. This has not been helped by the fact that children with Down Syndrome often lack drive. It is now being realised that early stimulation and developmental physiotherapy can help your baby reach his milestones at an earlier age.

Many babies with Down Syndrome have poor muscle tone and lie quietly in their cots and do not attract attention with movement and noises as would other children. It is for this reason that most mothers think they are "good" babies and leave them to lie peacefully in their cots.

Lack of curiosity and interest in the surroundings appears to be a characteristic of the syndrome and these children seem to need more sensory input than the inquisitive child who actively interacts with the environment. It is easy for the children to miss the opportunity of exploring and learning when the brain and musculo-skeletal system is at a stage of a fast rate of growth and development, and so fail to reach their potential.

It is by handling and playing with your child that he becomes more aware of his body, his social and physical environment and their relationship to each other. As well as these general activities the child may need specific activities to help him experience the feel of normal movement.

The following activities can aid the development of any child but they have been selected to meet the specific needs of a child with Down Syndrome. Once a specific movement is developed it should be practised, so that it becomes an established part of his movement repertoire. You will be able to adapt and modify the activities to become part of your normal daily handling of, and interaction with, your baby.

Care must be taken not to tire your child and a little exercise often is the best rule. This especially applies to babies with heart problems as they are more susceptible to tiring. Take care also, to keep the activities enjoyable and not a source of stress for either you or your child.

As your child develops more and more, and starts to explore the environment, make sure that there are many and varied objects and activities available so that the process of learning can continue.

The booklet has been divided into four sections. We have not applied an age limit to any of these as there is a wide age range in the achievement of all babies. Your child may be doing activities from various sections at any one time so the four sections have only been used as a very broad outline.

The programme we have presented is merely a guideline showing the basic principles which apply when helping a child with Down Syndrome and by no means demonstrates all techniques available. We strongly urge that you seek out the advice of a physiotherapist wherever possible.

For simplicity, we refer throughout this booklet to the caregiver as "she" and to the child as "he". We would like to emphasize that the activities are designed for all caregivers - fathers, grandparents, siblings as well as mothers.

OUTLINE OF BASIC PHYSIOTHERAPY PRINCIPLES

In this section we have outlined some of the basic principles, philosophies and developmental progressions seen in the physiotherapy management of delayed motor development.

Developmental progress is made in different areas including physical, intellectual, emotional and social. There is a close interrelationship between these areas and advancement in one is invariably reflected in the others.

Many different factors influence a child's development. Developmental milestones are often connected with age norms, but there is considerable variation both in the sequence of motor development and in the age at which the principle milestones occur.

Many people think of movement occuring in only one plane or another. No movement is ever simple, however, and it involves a complex interplay of events, actions and interactions to achieve a desired response.

All too often too much emphasis is placed on achieving a particular response when it is ***how*** the action has taken place that is the important feature.

There are two main elements that are the keys to fluent movement. These are

1. rotation, and
2. lateral transfer of weight.

The rotation is an important part of movement from a very early age and as such is to be encouraged in general handling, carrying and positioning throughout the day.

Lateral weight shift plays a particularly important role in walking. Without the ability to do this, you cannot shift weight on to one foot to step with the other.

In all your handling (particularly when giving tactile stimulation) be definite and firm, but gentle. In general, babies respond much better to this and feel more secure and content.

Feeding

With the Down Syndrome baby it is usually problems with feeding that are first encountered. Not every child will present with feeding problems, but if they do it is largely due to the low tone (hypotonicity) of the muscles of the face and mouth (oro-facial muscles).

There are four major reasons why oro-facial problems should be dealt with in the initial stages:

1. to enable adequate nutrition to be supplied to the baby,
2. to lay the foundation of good oro-muscular control for later speech,
3. for cosmetic reasons, and
4. to help with the development of parent-infant attachment.

Babies with Down Syndrome seem to have a large tongue, but this is mainly due to their hypotonia in conjunction with their fore-shortened jaw. For the four reasons mentioned above, it is important that the tone in the tongue is increased. If the baby has a hypotonic tongue, it hangs limply out of his mouth most of the time. It is important that the tongue is correctly positioned on the floor of the mouth for feeding so that a good sucking action and hence a good swallow can be achieved.

Oro-facial treatment techniques can be used separately or can be combined to achieve the desired response. In selection of your techniques be guided by baby's response to your stimulation. These may be done any time during the day and not just confined to meal times.

Head Control

Head control may be slow to develop in babies with Down Syndrome. The baby may therefore not be able to raise his head while lying on his tummy or back at the usual age.

Reasons for failure may include delayed maturation of the nervous system, hypotonia of the muscles of the head and trunk, dislike of lying on his tummy, lack of handling or lack of drive. The first purposeful movement a baby achieves is lifting his head against gravity while lying on his tummy. If left to lie on his back he is unlikely to achieve much head and neck control. This development of extensor tone begins in the neck and gradually extends to the spine, arms and hips. It is therefore suggested that the baby be placed on his tummy during the day to aid in the development of this movement.

Head movement and head control are key factors in the baby's development and unnecessary delay in this area will cause more delayed development. The baby will be unable to develop good eye-hand control, visual acuity and balance against gravity or roll, eat, or vocalize properly.

It is therefore important that your baby be handled and carried as much as possible in the early months. He needs the general stimulation that handling offers but he may also be given specific stimulus which will facilitate the development of head control. The application of this should be carried through to functional activities such as carrying, rolling, etc.

Rolling

As pointed out earlier, trunk rotation is an important element of general daily movement. Rolling of course is the first functional application of this by the infant.

It is often found that children with Down Syndrome need a little help to give them the "feel" of what it is like to roll. This can be facilitated from the arms, legs or trunk, depending on which area you want the baby to actively control. If you find you are having to help often, change your handling point as this part does not actively participate in the movement.

Once he has an idea of the movement, you can encourage him to roll by placing a toy out of his reach.

General Body Awareness

Sensation is the basis of experience. Through a sense of curiosity, most babies will seek their own sensory stimulation. This enhances their knowledge and perceptions and awakens active responses from them. Babies with Down Syndrome, however, will often need help to see, taste, smell, hear, feel and experience normal movement.

In the early months the tactile (touch), proprioceptive (awareness of where body is in space or position sense) and vestibular (orientation in space without vision) systems contribute the greatest percentage of input for the infant. As he moves, touches and becomes aware of both himself and surrounding objects, the development of body image and the basis of form perception is begun.

Tactile stimulation is a valuable tool in helping to increase body awareness and tone. It will help him to learn to relate touch and position and begin to make him aware of his body parts. In the early months a baby will take objects to his mouth. (This is called mouthing.) This provides sensory stimulation, and the baby should be positioned so that he can explore his hands and feet with his mouth as well.

Proprioceptive input, together with integration of tactile and vestibular information, provides the child with awareness of the position of his body in space and of movement and it increases tone. This input involves any type of activity which gives gentle compression or distraction to the joints.

The role of the vestibular system in sensory integration is very important. It plays an integrative role, contributing towards a large range of functions - from acquiring balance reactions to enhancing perception. The vestibular receptors are in the inner ear and respond to movement of the head in ***any*** direction. Input can be either excitatory (playfully throwing a child in the air) or inhibitory (slowly rocking a child off to sleep). It is the change of direction that is important rather than the movement itself. Therefore input can be through a variety of ways - rocking off to sleep, moving quickly up into the air, bouncing up and down on his feet, rotation or spinning. Spinning will help increase muscle tone but extreme care must be taken with this, as a very young baby can only tolerate half a turn at a time. Because of the effect of vestibular stimulation on vital functions, e.g. increase in heart rate, this is particularly important in babies who have cardiac problems. By the time they are 1 year old they can usually tolerate one or one-and-a-half to two turns at a time. Rapid spinning (one turn per second) should ***only*** be done when the child is much older, and then only with extreme caution. Don't forget to turn in both directions.

It is important that there are always one or two objects nearby to stimulate baby's vision - too many can confuse. Eye follow should be encouraged by moving objects within the baby's range of vision. He should also be encouraged to feel and look at his body at the same time so as to increase his body awareness. The child then learns to explore an object with his eyes in the same manner as he previously explored it with his hands, matching the previous tactile information with his present visual experience.

The localization and interpretation of sound is very important and the baby must be taught to listen and identify familiar sounds. Initially bells or rattles

may be used to arrest his attention, to stimulate visual localization and to encourage head turning. Talk to the child all the time so that he can catch the rhythms of speech. Long before he can speak, sing and talk to him using some of the infant rhymes that have actions, e.g. "Here is the church, here is the steeple", etc.

Taste and smell are also senses that need to be stimulated. Offer your child a wide variety of tastes through different foods and liquids. When stimulating his sense of smell use the most natural forms and combinations of stimuli.

Sitting

Initially in the first 4 months, when the child is placed in a sitting position, it is with his trunk supported so as to gain head control. Independent sitting should then be encouraged by gradually removing support from the trunk.

When the child has developed sufficient head control, he may be positioned in sitting for longer periods. This position is useful for the facilitation and strengthening of back extension and the development of postural control.

It is also important that the side-sitting position be introduced to the child at an early age as this position enables early progression to the all fours position and crawling. Side-sitting requires a considerable amount of trunk rotation and, as mentioned earlier, this rotation is one of the prerequisites for fluent movement.

As the child's balance improves, he will be able to maintain the sitting posture automatically and his hands will be free to further develop eye-hand coordination and manipulative abilities. The child with good balance or equilibrium reactions is able to adopt various sitting postures and maintain them easily.

Crawling

Crawling is an often discussed stage in the neurodevelopmental sequence. This activity of crawling on all fours has three stages:

1. Static - here the baby learns to master his balance in a static position.
2. Shifting weight - the child learns to move his weight backwards and forwards, from side to side and on alternate arms and legs whilst maintaining his balance.
3. Crawling - when a baby learns to crawl, a whole new world of exploration and discovery opens up to him. It also enables him to decide for himself where he wants to go and what objects he wants to move towards. Crawling encourages a high degree of head and trunk extension and increases the strength of these extensor muscles.

At first you may need to put baby in the crawling position and rock him to give him the feel of shifting weight. He will then develop the ability to weight transfer himself and will progress on to independent crawling.

There is a lot of discussion regarding the pros and cons of the need to crawl and the effect that "not crawling" has on later development. There is not

yet any conclusive evidence on this subject. It would seem, however, that as long as the fundamental experiences usually gained when crawling (i.e., rotation, weight shift, coordination and balance) are achieved elsewhere during development, then the act of crawling itself is not so vital.

Standing and Walking

After your child has attained independent sitting, he can be encouraged to pull to stand by himself. However, you can encourage earlier weight bearing through his legs by bouncing him up and down on your lap. It is suggested that this builds up the supportive reflex and conditions your child to taking his weight on the soles of his feet. Note, however, that for a certain period during the child's development, he will go through a stage of not wanting to stand (abasia).

Once your child is standing, weight transfer sideways and forwards can be initiated by using the leg as a key point. This weight transference is an important prerequisite for walking and thus an important step in the progression. He can then be encouraged to walk around furniture or across small gaps between stable objects.

Walking requires an incredible interplay of various events, including postural and balance reactions, changes in muscle tone and sensory integration. It is just like any other achievement a child makes and is an indication of the status of the sensory motor system. It is important to remember that the step is not the significant factor and will not occur until all the prerequisites are filled.

All parents wait with apprehension for that first step, but at no stage should your child be forced to walk if his balance is not good as he may become fearful of falling.

Fine Motor Activities

In the early months of life, "fine motor activities" means providing the child with various objects and toys of different shapes, textures and sizes to play with.

Fine motor function develops along a fairly sequential pathway. Within the first year you will see your child's grasp develop from a "total hand" grasp to a "pincer" grasp where just the thumb and forefinger are used.

The development of fine motor control is once again dependent on the early and varied stimulation of the senses of the hand in particular, and the body in general.

Social Interaction

The most important point to be stressed here is the all-important need for the development of attachment between the child and his family. In their first years, children with Down Syndrome progress along a normal path of social development. This at first may be slow because the early smiles, laughs and vocalizations tend to be more delayed than those of other children. It is important, however, to provide pleasant and enjoyable interactions. Don't

make the parent-child playtime a serious teaching session without pleasure to either participant even though the child may have special needs you have to meet. With time they will develop into smiling, happy, sociable children.

WHAT TO DO FIRST

How to carry your baby

Note

- Vary the way you carry your child so that he is always experiencing different positions, movements and visual stimuli.
- Always give ***just enough*** head and trunk support to your baby.

1. This is a carrying position you may use right from birth. He will not have head control at this stage, so the best way to carry is with his head and shoulder supported in your elbow, with the hand of the same arm holding his outside leg. This leaves your other hand free.

By holding him in this semi-sitting position you are encouraging:

(a) the beginnings of good head control,

(b) visual interaction with people and the environment.

2. As your baby develops some head control you can lower the support (your elbow) until the shoulders only are supported.

Photograph A

Photograph B

3. Carrying your baby on his stomach along your arm enables him to develop further head control. This method can be used right from the start even when your baby has no head control. The position is excellent as it allows your baby to see, once again encouraging good visual interaction and active head control.

This can be done with the baby's head either at your elbow (photograph A) or on your hand (photograph B).

You can also carry your baby over your shoulder. While in this position you can firmly but gently stroke the back of his shoulders and neck. This encourages him to hold his head in the midline and therefore develops better head control.

There may be other ways you find suitable to hold and carry your baby. Use these methods, remembering that the aim with any carrying position is to give your child just the right amount of support so that his neck muscles are actively working within his capabilities.

Feeding

Note

- Take time to experiment with comfortable and practical feeding positions for you and your baby.
- To make feeding easier use stimulation in and around the mouth to improve the tone of the muscles of the face, mouth, neck and tongue.
- Give your baby time to respond to any stimulation you give him.

1. When preparing to feed your baby, make sure you are in a comfortable, fully supported position.

Have your baby in a half sitting position with his head comfortably supported in your arm.

Photograph A

Photograph B

2. If you are breast feeding you may find that you need to give the baby more "breathing space". Therefore try to use a less encompassing position for feeding.

The positions shown here allow you to have more active control of the baby's head and mouth.

Photograph A shows the head being held with the hand on the same side as baby is feeding from.

Photograph B shows using the opposite hand.

Whichever one you use, it still gives you a free hand to stimulate lip closure and sucking if necessary.

Photograph A

Photograph B

3. If your baby has trouble closing his lips tightly around the teat or nipple, before feeding you may need to stimulate the muscles he uses. This is done by stroking around alternate corners of the mouth with the pad of your finger.

Stimulate one corner of the mouth through the arc of a semi-circle. Photograph A shows the starting point of your finger. Photograph B shows the finishing position.

Wait 2 or 3 seconds for a response then stroke the other corner. The response is a slight puckering of the lips.

Do this 2 or 3 times on each side.

Do not worry if you do not see a response. In some babies the stimulation can cause an increase in muscle tone without this being visible.

This technique can be repeated any time during a feed or when your baby stops to rest. Remember always to give your baby time to respond to the stimulation you give him.

4. If your baby thrusts his tongue out when you attempt to feed him, lightly touch the tip of his tongue with your finger.

Wait for him to respond - that is, take his tongue back into his mouth.

With a small percentage of babies this tongue tipping does not work. If this is the case, try gently pushing his tongue in behind his bottom teeth.

These "tongue tipping" techniques can be done at any time during the day if baby hangs his tongue out, because just moving the tongue helps increase muscle tone. This tone is essential for good speech development in later life.

5. When he pulls his tongue back in, place the bottle in the baby's mouth.

Make sure the teat is placed on top of the tongue and not pushed back against a "bent up tongue", as obviously in this position the baby will not be able to suck properly.

6. By using the ring and index fingers of the hand holding the bottle you can gently push the corners of the mouth against the teat to aid in achieving a firmer seal around the teat or nipple.

This will help to prevent your baby sucking in air and dribbling from the side of his mouth.

Photograph A

Photograph B

7. In the above position the index finger can be placed under the chin to aid swallowing. Care must be taken not to place your finger too far back as this will cause the baby to gag.

Photograph A shows the correct position with the finger just behind the bony area of the jaw.

Photograph B shows the incorrect position with the finger too far back.

8. Your baby may have poor lip seal across the top and bottom of the teat. In this case, the index and middle fingers may be placed above and below the lips, lightly pressing them together to help aid lip closure.

This photograph has been taken without the bottle so that you can clearly see the finger position, but the bottle should be held in the other hand.

Photograph A

Photograph B

9. To improve baby's sucking ability, intermittent traction can be applied to the bottle. This is done by gently pulling the bottle until the teat moves about 1 cm within the baby's mouth. The traction is then released so that baby sucks the teat back in.

This is repeated rhythmically as baby sucks.

Photograph A shows the normal position of the teat within baby's mouth.

Photograph B shows traction being applied to the bottle.

Do this technique gently so that you can feel your baby still has "hold" of the teat at all times.

Once again give your baby time to respond to your stimulus.

Any combinations of these feeding techniques can be used at each feed, and you should continue using them until you feel your baby can cope adequately without them - this may be a few feeds, a few weeks, or a few months.

Do not hesitate to experiment.

Increasing Awareness

Note

- Always use firm, decisive handling with your baby. Do not forget at this stage he will startle easily at sudden moves and loud noises.
- Present your baby with as many experiences as you think of to stimulate all his senses.
- Improve your baby's awareness of his body, its relationship to other things, and his position in space.
- Do not forget the importance of your baby seeing (provide visual stimuli) and hearing (provide auditory stimuli) from a very early stage.
- Initially, choose three activities applicable to your baby's present developmental level and do these at change and bath times.
- As your baby spends less time sleeping, the activities can be incorporated into his play time and carried out for longer periods.

1. Toys and modules that are bright and/or make a sound help to stimulate your baby's eye, head and limb movements.

But probably the most important thing for baby at this stage is his mother's face, voice and touch.

You can increase baby's body awareness and muscle tone by rubbing him all over, including his face. Stroke the length of his arms, body and legs firmly but lightly with your hands to help him become aware of himself.

Talk to him and put him in a position where it is easy for you to have good eye-to-eye contact (e.g. on lap).

2. A commercially available toy rack is an excellent way to put toys within your baby's sight and reach.

3. While your baby is lying on his back, gentle pressure may be given down through his bent arm to help increase muscle tone, awareness of position, and movement.

4. Pressure can be given through your baby's heel using the heel of your hand. His leg should be well supported with the hip and knee either bent or straight.

Pressure should be applied up towards the knee.

5. Clap baby's hands together to help encourage voluntary movement. This also gives him the feel of movement in the midline and helps him become aware of his hands.

Photograph A

Photograph B

6. You can also clap baby's feet together (photograph A) and bring them up to his mouth (photograph B) to enable him to see and feel the movement of his legs.

These are common play activities, but are very beneficial for your baby.

Mouthing is a very important part of his development and should be encouraged.

7. At this stage baby's "motion detectors" (which are in his inner ear) are very sensitive to movement. The normal reaction when nursing a baby is to rock him from side to side. This slow rhythmic movement has an inhibiting effect on his motion detectors and will therefore calm the baby and put him to sleep.

A more "stimulating" movement can be used, but this should still be smooth and fairly slow particularly with little babies.

As shown above, you can move your baby through space up into the air. (This is also a fairly natural activity that is done with a baby.)

8. You can also stimulate your baby's motion detectors by slowly moving round in a semi-circle.

A little and often is the best rule.

Head Control

Note

- From a very early age you should help to encourage the development of baby's head control, as this is the starting point for movement control of the whole body.
- Always be careful, but never underestimate your baby's ability to "hold" his own head, even if it is momentary.
- Don't always put your baby in the same position.

1. Position your baby on his stomach often during the day. This position encourages movement of his head, resulting in an increase in the strength of his neck and back muscles.

Attract his attention with your voice and bright toys, and stimulate his neck and back muscles with your hand. Once again, use firm but gentle pressure with the pads of your fingers or your whole hand.

2. Your baby may also be positioned with a rolled up nappy or small towel under his armpits. Here his head can be brought to the midline and he can attempt to lift it up. This position also allows him to bring his hands to the midline for play.

3. Stroke the length of baby's back with your hand. If your baby has no head control you can support under his chin with your other hand. As you stroke his back, gradually raise his head slightly to give him the feel of the movement. To further stimulate the muscles reduce your support slightly thereby encouraging the muscles to work more.

4. As head control develops support can be removed from the chin. You can stroke down your baby's back as previously shown but alternate hands can now be used.

5. Initial head control can also be encouraged with your baby in the sitting position. Support his head and shoulders, and if necessary the side of his trunk. Make sure to use the flat of your hands to do this.

When he is steady in this position, move your fingers slightly away from his head (about 2 cm) and gently sway him from side to side. His head will move to one side but your fingers will stop his head moving unnecessarily. Because baby's neck muscles are working least against gravity in this position, it is easier for him to gain this initial head control even though his trunk still needs support.

Rolling Over

Note

- Your baby will not roll until he has some head control.
- Ability to rotate his trunk is also a prerequisite for rolling.

1. Your baby is not developmentally mature enough to roll over by himself at this stage, but you can give him the "feel" of the action by carrying out the following activity.

Cup your hands over baby's bent knees and move them from side to side. After each movement wait for the opposite shoulder to lift off the bed. At first baby may not do this and it may therefore be necessary for you to gently lift his shoulder for him so that he can get the feel of the movement.

Picking Up

Note

- There are many ways to pick up a baby - all of them are correct if they incorporate the basic principles.
- Try to remember to always pick up your baby in such a way that he is actively contributing.
- Always use trunk rotation.
- Always handle your baby so as to encourage as much head control as possible.

Photograph B

Photograph C

1. As you can see from the above photographs, "direct" head support need not be given to even the youngest of babies.

Here head and neck support is coming from the left shoulder which in turn is being controlled by the mother's right hand.

Photograph A shows the starting position with your baby on your lap.

Photograph B shows the midposition when picking up your baby. Note the trunk rotation, and the support of the head coming indirectly from the shoulder. If your baby has very poor tone, you may need to support the whole lower trunk as well.

Photograph C shows the child about to be "picked up".

2. This series of photographs shows another way to pick up your baby. With this method you are using several principles. The main point to remember is to use weight bearing down through the baby's right arm, and a gentle traction on his left arm to get him from lying to sitting.

You can use this method of sitting up from a surprisingly early age with your baby, but, as already stressed, it is important to give baby time to respond. So do not just pull baby up by one arm, but give a little pull (i.e. "take the slack"), wait till you can feel the response of baby's muscles contracting, then gently help him into the sitting position. Once again notice the use of trunk rotation.

Social Interaction

Note

- Eye to eye contact is very important at this stage. This encourages smiling - one of the first social milestones.
- Always talk to your child and encourage him to interact with family members.

1. Toward the latter part of this stage when your baby has good eye to eye contact with you and is smiling, encourage him to look at and talk to himself in a mirror.

2. Encourage your baby to attend to your face and respond to your different facial expressions.

It is important to vary these expressions when talking to your baby, e.g. frown, surprise, laugh, etc.

WHEN BABY IS OLDER

How to carry your baby

Note

- Your child's head and back control will continue to improve quickly. When carrying the emphasis is once again on giving ***just*** the right amount of support your baby needs.
- At this stage your baby will be starting to take in what is going on around him. Encourage this and make the most of the situation by varying the carrying position.

Photograph A

Photograph B

1. As back control develops you may lower the support you give even further so that it is at the pelvis.

As he gets bigger and heavier this method still enables you to carry him comfortably. This position also makes it necessary for him to practice his head control.

Photograph A shows a side view of this carrying position with the hand around one leg.

Photograph B shows the carrying position from the front.

2. As full back control develops your baby will not need your support at the back. He can then be comfortably carried sitting on your forearm.

Feeding

Note

- The feeding techniques and methods described in "What to do first" are still very important. You may find your child still needs work particularly for tongue placement and lip closure.
- Experience with solids. Give your baby different "experiences" with food consistency and texture. Of course always be careful, but do not underestimate your child's ability to cope with this.

1. This shows a very useful position for feeding, with your baby sitting in the triangle of your leg. By moving your leg up and down, you can have excellent control over the amount of back support you are giving.

2. When starting to feed your baby solid foods, use a spoon that is short, shallow and rounded. If he still thrusts out his tongue the technique mentioned in the previous section (paragraph 4, page 15) can be used to stimulate tongue withdrawal.

Place a small amount of food on the front of the spoon only to make it easier for him to cope.

The spoon should be placed on top of his tongue and forced into his mouth especially if the tongue is not resting on the floor of his mouth.

3. Do not passively remove the contents of the spoon by pushing up against the roof of the mouth to scrape the food off. By applying gentle pressure on the tongue with the spoon, your baby will be encouraged to loosen his mouth and actively remove the food with the inside of his lips.

Do not forget to give him time to respond.

If your baby has poor lip closure, the same techniques that were described in the previous section can be used here before feeding (paragraph 3, page 14), and when the spoon is in the baby's mouth (paragraph 8, page 17). Slight pressure can be given under the chin (paragraph 7, page 16) if your baby is having trouble swallowing.

4. When your baby is ready to start chewing, place a small amount of solid food such as meat or crust between his molar gums and cheek on one side of his mouth. This stimulates the chewing action and then the baby uses the tongue to manipulate the food into the centre of his mouth for swallowing. This will further develop his tongue tone and movement.

During early days of introducing solids you should also use the "messiness" of feeding time to stimulate lip and tongue movement. Encourage your baby to use his tongue to retrieve food from his face. Introduce substances that need quite a lot of work to clear the mouth, for example, a spoonful of peanut butter.

Increasing Awareness

Note

- The activities outlined in the previous "increasing awareness section" are all still very important at this stage as indeed they are right through out your child's first years. The following activities can be done in addition when your child is past the baby stage.
- Make sure you let your baby experience different movements, positions and stimuli.
- Do not forget the importance of auditory stimuli - Mum and Dad's voices are very important.

1. With your baby lying on his back, grasp his lower leg and foot and move his legs alternately in a kicking or bicycling movement.

When his leg is in the bent position, give an extra push through the heel and wait momentarily for your baby to try and push back into your hands.

2. With your baby lying on his back use the heel of your hand and stroke diagonally across his tummy from one hip to his rib cage on the opposite side. The abdominal or tummy muscles are used when moving, from lying to sitting. They also play a very important role in bracing the lower back in antigravity positions (e.g. sitting, crawling and standing).

After each stroke, give your baby time to respond (i.e., tightening his stomach muscles). This movement should be repeated two or three times to each side.

As your child becomes older you can incorporate these "exercises" into games where the abdominal muscles actively contract, e.g. "See Saw Marjory Daw" while he is sitting on your lap.

3. To help stimulate deeper breathing press your baby's knees up on to his stomach and hold for a few seconds.

This causes your baby to breathe out fully, places a small stretch on his muscles used for breathing, and consequently helps him to take a deeper breath when the pressure is released.

This may be done four or five times.

4. Your baby should be encouraged to focus on and visually follow a moving object. Use your face for baby to follow, or a bright eye-catching object.

Remember to hold the object at a distance that is comfortable for baby to focus on. Move the object in all directions, but do so slowly and smoothly.

Photograph A

Photograph B

5. Your child will start showing interest in reaching for objects. This is a sign of his need to physically explore and discover the relationship between himself and his environment.

He will do this with his hands (Photograph A) and legs (Photograph B).

Head Control

Note

- You should now be working for good, independent head and upper trunk control.
- Continue presenting your baby with many varied positions and situations in which he can practice head control.

1. This exercise is for babies who already have enough head control to keep their head steady when held in the sitting position.

Cup your hands around his shoulders and sway him from side to side. Initially only a gentle swaying movement is attempted. As he improves the swaying can be increased gradually until his opposite buttock lifts off the bed. After the movement to one side, wait for your baby to right his head - that is, bring it back to the vertical position.

When this is achieved repeat the movement to the other side.

Rolling Over

Note

- Your baby will be starting to show some interest in rolling over. Encourage him with your voice, face, bright objects, etc.
- Don't forget to encourage him to roll in both directions.
- Try to remember to always turn your baby in the ways described.

1. With your baby positioned on his back place one hand around his bent knee and the other hand on his opposite arm.

Roll baby by moving his bent knee towards the opposite shoulder making sure to tuck his arm underneath him as you go.

Once his arm is tucked under you can remove your hand.

Continue this movement until baby is positioned on his stomach.

2. If at the end of the roll his arm is caught under him, lift his hip or shoulder on the same side to release it.

3. When rolling baby from his stomach to his back the same method is used. Bend his knee up under him and push it towards his opposite shoulder, keeping it as close to his body as possible.

Make sure the arm he is going to roll over is straight - either by his side or above his head.

As your baby becomes older and stronger you will feel him start to help. When this occurs gradually decrease your assistance so that you are giving him just enough help to allow him to complete the movement.

As he becomes more proficient at rolling you may find that the only assistance you need give him is a slight pull across his tummy to initiate the movement.

Picking Up

Note

- Continue with the same principles when picking up your child as described in the previous section (page 26).

The same techniques as described earlier may be used when picking up your older child.

Active participation by the child in this activity can be further encouraged (e.g. propping on one arm and abdominal contraction).

Fine Motor Activities

Note

- Your child is really starting to explore his environment with his hands, aided by his ability to use vision to direct his movement.
- Present him with objects of varying shapes, sizes, and textures.

1. "Mouthing" will be seen strongly at this stage. This means that everything your baby gets hold of will go straight to his mouth. This is all part of his insatiable need to explore and discover.

Photograph A

Photograph B

2. He will use two hands to reach for and manipulate an object presented in the midline (i.e. directly in front of and in the middle) as shown in Photograph A.

He will also transfer some objects from one hand to the other (Photograph B). His ability to do this will depend on the size and shape of the object as he has not yet developed really fine control.

3. At first his grasp will tend to be a simple one. There will be little use of his thumb and he will tend to hold objects pressed against his palm with his fingers.

This will soon develop one step further with the involvement of the thumb.

Social Interaction

Note

- Your child will become much more responsive to social situations and will be keen to interact with his environment.
- His social interaction at this stage is based very much round his visual and auditory responses and fine motor skills.
- He will start to experiment with sounds. This vocalising should be encouraged - stimulate child to laugh and mimic sound.

THE PRE-TODDLER STAGE

Feeding

Note

- Food will hold a fascination for your child. Don't forget that it offers not only nutritional value, but also a tactile and fine motor experience.
- "Finger foods" such as small cubes of food, sultanas, dried fruit, etc. are very useful at this stage.

1. Your baby will be ready for a cup by this stage. Use one made of hard plastic with one or two handles. Encourage him to hold the cup himself.

Try a cup with a spout with holes, but without an "air" hole in the lid. These mugs allow your baby to "control" the flow of fluid a lot more successfully.

2. When you give your child implements for self feeding, make sure they are appropriate for his needs.

Independent feeding should be encouraged, but remember there is sure to be a mess!

Sitting

Note

- Sitting is not a static state - limb and trunk movements are to be encouraged while your child is in the sitting position.
- Once a child has achieved the motor skill of sitting, the tendency is to always place your child in that position. The important point in your child's motor development is not the attainment of a motor skill (i.e. in this case sitting), but how the skill is used.

1. There are certain sitting positions that, if used to the exclusion of all others, are not good for your baby.

Watch for the child who sits "between his knees" ("N" sitting). This "turning in" at the hips puts unnatural stress on the hip and knee joints in particular.

DO NOT ALLOW YOUR CHILD TO SIT LIKE THIS

Photograph A

Photograph B

2. Another position to be avoided is seen above where the child is "sitting forward" between his hips. (Photograph A)

This is an easy position to become "stuck" in and therefore doesn't give the child any opportunity to practice balancing.

If your child is sitting with his legs forward, make sure he is sitting right up on his bottom. (Photograph B)

3. Sitting with his legs together and to one side is a more practical position as it encourages trunk rotation, allows for balance skills to be practised, and makes it impossible to sit between the hips.

The trunk rotation, that side sitting encourages, allows your child to more easily get on to hands and knees to crawl, or to stand up.

Photograph A

Photograph B

4. Sitting cross legged is another position your child may adopt (Photograph A). It is better if he sits with his legs semi-bent up in front of him (Photograph B). The previous photographs show varying sitting positions. As with anything new you may feel he needs watching and you may occasionally need to steady him.

5. After a while your child will bring in the protective reactions in his arms while sitting.

He will use these to stop himself from falling when he turns to one side or when he tips off balance.

At first you may need to give him the feeling of taking weight through his arms. This is done with your child in a sitting position.

Put one arm out to the side and firmly push down through it, keeping the elbow straight with your hand.

Because children with Down Syndrome often have relatively short limbs you may find that it is necessary to put a folded towel (or something similar) either side of your child to allow him to use his protective reactions.

Once he has the idea of these reactions, there may be no further need for the towel.

6. After doing the above preparatory activity, you can gently tip your child off balance so that he can bring in these reactions himself.

7. Soon he will be able to automatically bring in his protective reactions. You can encourage this by placing toys at his side, just out of reach.

Balancing in Sitting

Note

- As your child develops you will find that he will be able to right himself by moving his head and trunk without having to bring in his protective reactions. You can elicit these reactions by tipping him off balance.
- Initially your baby will only be able to use his balance reactions when slowly tipped but as he becomes more adept you will be able to tip him more quickly.
- It must be remembered that if you push a person of any age off balance to quickly he will use his protective reactions.

1. Initially your child should be supported round the hips to be tipped.

Once he can manage this you can hold him around his knees and tip him. From this position he may be tipped in any direction.

When tipped to one side he will bring his head and trunk to the midline and when tipped backwards he will bring his trunk and head forward in an attempt to right himself.

2. As baby's sitting balance improves, you can put him in positions that require him to use both his protective and equilibrium reactions. This can be done by sitting him on a low stool, and encouraging him to reach out to the side. This also elicits good active trunk rotation.

Preparing for Crawling

Note

- There is some controversy about the need for, and role of crawling. It is the development of muscle control around the hip and shoulders which is important, rather than the development of crawling itself.
- Ability to shift weight in all directions is a prerequisite for crawling.
- Watch for hyperextension of the elbows. This prevents the development of muscular control around the elbows. Also make sure that the knees are under the hips, not splayed out.
- Good strength and tone in the abdominal, and back extension muscles is desirable before crawling.

1. While sitting on the floor, position your child on his tummy over your extended legs.

With your hand over his bottom push down through his bent knees so that he can feel weight being taken through them.

In the same manner pressure can be applied down through shoulders with his arms straight. Watch that his hands are open and flat on the ground.

By rolling your legs you can move your child backwards and forwards, thereby enabling him to take weight and pressure either through his arms or legs, without changing your position.

Photograph A

Photograph B

2. Another activity which will encourage him to take weight through his arms and help prepare him for crawling is done by holding him over a low table.

Do this with one hand under his chest and the other round his legs so that his extended arms are on the table and he can take weight through them (Photograph A).

As the strength in his arms increases you can decrease the support you give him, thereby allowing him to take more weight through them. This can also be achieved by moving your support back towards his hips. Also try walking him along on his hands (Photograph B).

Photograph A

Photograph B

3. You can put baby in the crawling position and gently rock him backwards and forwards (Photograph A) or from side to side (Photograph B).

This encourages stability in this position and also allows your child to feel weight through his arms and legs.

He will often do this himself before he attempts to crawl.

4. When he is ready he will crawl himself, but he can be encouraged by placing a bright object nearby so that he can crawl towards it.

Preparing for Standing and Walking

Note

- Encourage your child, but always let him proceed at his own pace.
- This is a valuable time for developing a good basis for walking, so give him plenty of time to practice.

Photograph A

Photograph B

Photograph C

1. While kneeling on the floor and sitting back on your feet, sit your child on your knees so that his knees and hips are at right angles (Photograph A).

Cup your hands over his knees and with your body behind his bottom, push his hips forward and stand him up, making sure his weight ends up well forward over his feet (Photograph B and C).

Your hands are used to control his knees so that they do not collapse.

When he is standing you can help him "feel the weight" through his legs by giving compression down through his legs at his knees.

Doing these types of activities near a low table gives your child a surface at a good height for playing. It also provides that little bit of "chest" stability which is necessary to make him feel safe and secure.

2. Another way to aid standing is for you to place only one hand over his knees. Use the other one behind his bottom, to help him up to the standing position.

3. To encourage baby to pull himself to standing, sit him near a low stable object (e.g. couch or coffee table) that he can hold on to. Place a toy that he wants on the coffee table in such a way that he will have to stand to reach it.

Fine Motor Activities

Note

- Lots of different fine motor experiences are very useful at this stage to help your child gain good hand control.
- A basket full of sophisticated and expensive toys is not necessary. Many day-to-day household objects will be just as varied and interesting to him.
- Don't get too worried about your child being a messy eater and playing in his food - it is all part of normal development.

Photograph A

Photograph B

1. There is often a big surge in fine motor interest at this stage.
Your child may well be developing the sense of the "permanence" of people and objects and will sit for some time placing objects in or under others (Photographs A and B).

2. Pointing and poking with the index finger also begins to emerge.

3. He will also spend a lot of time transferring objects from one hand to the other and back again. This is a nature transfering pattern.

4. His palmar grasp of slightly bigger objects will improve. The thumb will actively be involved with the fingers to hold the object next to the palm.

5. Shortly after this you will notice that the palm isn't needed so much for stabilization, and objects will tend to be held more in the fingers.

Social Interaction

Notes

- This is the time for the development of the concept of object permanence. Your child will enjoy the "game" of dropping things from his high chair so that someone else can make them reappear.

- Object permanence relates not only to things, but to people too - that means you! This is often a stage where your child will become quite upset when separated from you, or when taken into new and different surroundings. Children may also become upset if familiar people suddenly change in appearance.

- At this stage children can identify different people, but they are still learning that if mother goes away she still exists and will return. Games like peek-a-boo are enjoyed and gives the child practice in learning that a person out of sight has not disappeared for good.

TIME FOR CO-ORDINATION

Side-Stepping

Note

- The ability to take weight on one leg only is an essential prerequisite for walking.
- Remember to place your child near objects of a height that he can easily walk between.

Photograph A

Photograph B

1. Once your child is standing you can encourage him to shift his weight from one leg to the other. This can be done by bending his knee and at the same time shifting his weight on to the other leg (Photograph A). Hold this gently for a couple of seconds to give him the feel of the movement. Then let his leg go and return to the original position (Photograph B).

The same effect can also be gained by gently tipping your child from the hip or shoulder. Remember to be gentle and always give him time to respond.

2. In this photo, the activity is being performed incorrectly. As you can see, the hip of the standing leg is "sticking out", and the body itself is not in line with the hip.

Photograph A

Photograph B

Photograph C

3. You can encourage your child to take a sideways step by lifting his right leg (Photograph A).

Place it a few inches closer to his left leg (Photograph B).

He will then shift his left leg further to the left in an effort to regain his initial "comfortable" base (Photograph C).

This of course can be repeated in the opposite direction.

4. Encourage him to practice balancing, weight shift, stepping and trunk rotation in a safe and comfortable standing position.

5. Then encourage him to move across small gaps.

6. Also encourage him to move from one height to another.

Walking Forward

Note

- A child's first independent steps are always a long awaited and well remembered happening. Remember that it is the quality of movement that is important and "the first steps" will happen in their own good time.

Photograph A

Photograph B

1. A weighted object or small stable trolley may be useful to help improve forward walking (Photograph A).
   You may also use your hands for support for walking (Photograph B).

2. To then encourage independent walking, stand him with his back to the wall for support.

Games such as "clap hands" may then be used to encourage your child to stand without the support of the wall.

Once he can do this you can then move a short distance away so that he actually has to take steps to reach you or the object you are holding.

Photograph A

Photograph B

3. Soon he will take independent steps by himself (Photograph A).

This will soon progress to being able to carry an object while walking (Photograph B).

Climbing Down

Note

- This is often difficult for parents to accept. Learn to watch but to trust your child's abilities.
- There are many varied ways to achieve this. Your child, with guidance, will use what is the easiest and most comfortable for him.

1. This is the safest way to teach a child to get down off a bed, chair, etc. As you can see by the series of photographs below, the sequence is basically

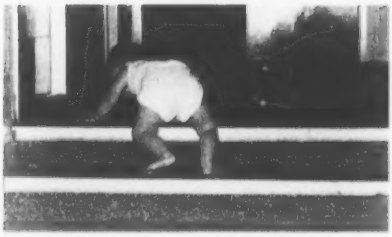
Starting position.

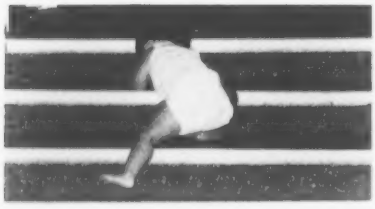
Bend up the underneath leg, and rotate the body.

Continue rotation over the leg by supporting the trunk on the supporting surface.

Leg out from under the body.

Slide down the front of the supporting surface to stand on the floor.





2. This series of photographs shows an easy way to descend stairs. A little at a time and slowly are the keys to success.

Increasing Awareness

Note

- It is important in his early years to continue to give your child stimulation to help increase his awareness of his body and his environment.
- Remember to vary this input to make it appropriate for his age.

1. By this age your child's nervous system is mature enough to take a little more movement input.

This can take the form of "rough and tumble" play, rolling, spinning, etc.

The above photographs show spinning in a chair. Even at this age, two or three slow turns (about one every one-and-a-half seconds) in each direction, with a rest of about half a minute in between, is plenty.

Fine Motor Activities

Note

- Continual exposure to fine motor experiences is good at this stage.
- You will also see the beginnings of spatial concepts and awareness, i.e. putting objects into boxes, under towels, throwing blocks, etc.

Photograph A

Photograph B

1. Increased fine motor performance can be seen in activities such as tearing paper (Photograph A) and "posting" objects (Photograph B).

Photograph A

Photograph B

2. You will also start to see the development of control of the finer (or intrinsic) muscles of the hand.

This will be evident in activities such as pulling toys by a string (Photograph A) and scribbling (Photograph B).

Photograph C

Photograph D

3. Other favourites to be encouraged at this age are playing with blocks (Photograph C) and using a spoon for feeding (Photograph D).

Social Interaction

Note

- This is the stage when interaction with other people and children develops. It may be a good idea to consider activities such as waterbabies, play groups or adventure playgrounds where your child can experiment and discover, while at the same time developing social communication.
- A consequence of this is learning to take turns and to give and take objects from another person.
- Symbolic play is also starting to emerge, e.g. playing with dolls, cars, etc. along with an interest in sounds and words.

Equipment

Chairs

You may or may not feel the need for a special chair for your child. Here are a few commercially available chairs that might be of some use at various stages of your baby's development:

1. Infant chair
2. A moulded, well supporting high chair
3. Port-a-chair
4. Stool.

Walking Trolley

These are easily constructed, or are readily available at many stores. The trolley should be stable and not able to be tipped back by a toddler.

Toy Racks

These are readily available, and basically consist of a metal frame to which toys can be attached.

Shoes and Socks

If your child is going to wear shoes and socks they both must fit correctly and be suitable for his needs. Natural materials (e.g. leather shoes and cotton or woollen socks) are best.

CONCLUSION

Children with Down Syndrome represent a significant proportion of those children who present with developmental delay. We have presented a general physiotherapy programme for treatment of the child with Down Syndrome which can be varied to meet each child's specific needs.

It is generally believed that for a child with Down Syndrome to reach his potential, early and global assistance is important. This may take many forms and generally involves a skilled "team", the most important members of course being the parents.

It is not enough to help the child only through the first few years of his life. He will always need some extra stimulation and help so that he can achieve the status of being an independent individual.